Butterfly Gardening & CONSERVATION

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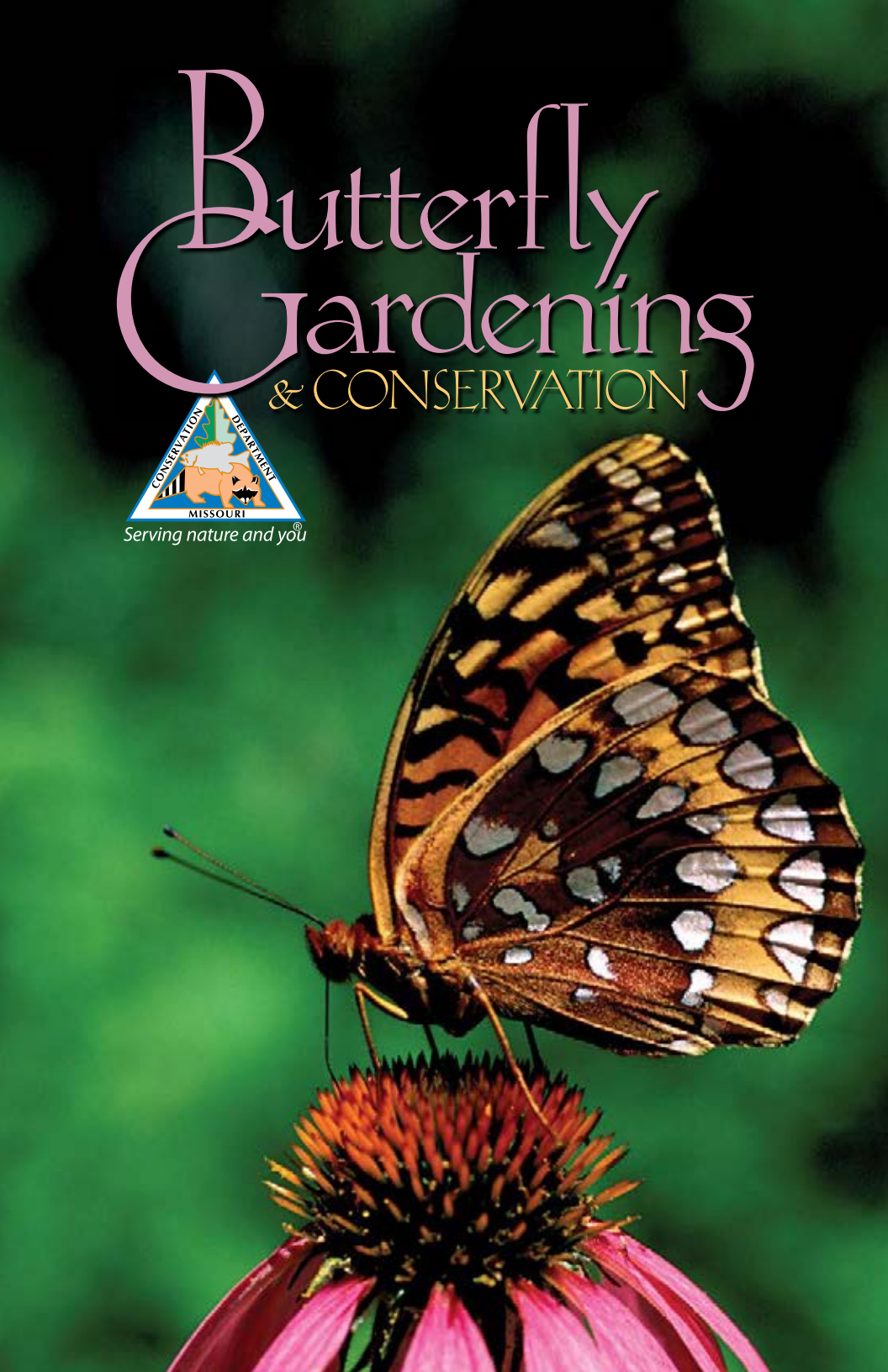

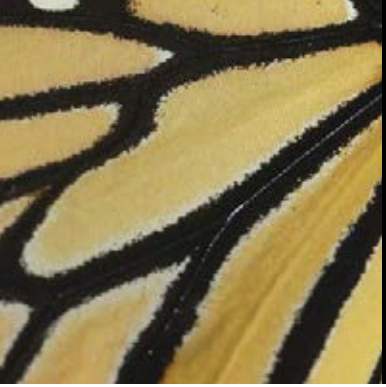

Jim Rathert

Butterfly Gardening & CONSERVATION

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Cover Photo by Jim Rathert
Author: Dave Tylka
Scientific Consultants: Robert Michael Pyle and Richard Heitzman

Introduction

Jim Rathert

Butterflies go wherever they please and please wherever they go.

They are messengers of nature, not only adding brilliance to their surroundings but also pollinating flowers and revealing the healthiness of our communities.

The role of butterflies is important in our natural world. Their sheer numbers supply a vast food source for predators, and they are significant plant pollinators. If plants are not pollinated, they can't produce seeds and fruits.

With their acute sensitivity to pesticides and toxins, butterflies' presence, diversity and relative abundance indicate the overall well-being of our ecosystems. Their message is simple. A healthy community usually has a large number and wide array of butterfly species. A contaminated or altered community doesn't.

Butterfly-watching ranks high among our outdoor pleasures, right alongside enjoying birds and wildflowers. The aesthetic appeal of these winged creatures is even more significant once we realize that butterflies neither sting, bite, nor transmit disease. This booklet can help you understand the habitat needs of butterflies and create a sanctuary for them in your yard.

Buckeye butterfly wing detail

Butterflies are unique

A special group of insects, butterflies arouse visions of bright color fluttering amidst sun-drenched, flowering meadows. Their color emanates from thousands of tiny, shinglelike scales delicately attached by thin stalks to a parchmentlike wing membrane. If you gently rub your finger across a butterfly wing, these stalks break and the scales brush off like dust.

Two types of color arise from the wing — pigmented and structural or iridescent hues. Pigmented colors, such as red, orange, yellow, and brown, come from the actual color pigment of each scale. In contrast, the iridescent, metallic colors such as blue, green, violet, silver, and gold are created by minute structures on the scale surface that bend light and reflect it.

To further understand what makes butterflies unique, consider the miracle of metamorphosis. The four stages in butterfly metamorphosis are egg, larva (caterpillar), pupa (chrysalis), and adult. Metamorphosis begins when the fertilized egg hatches into a small caterpillar. The caterpillar becomes an undulating eating machine, continually searching for food and appearing to grow larger by the hour. After finally getting its fill or devouring all available food in the area, the caterpillar slowly molts into an inactive, mummylike stage called the chrysalis. Within this waxy pupal case, the mystical transformation into adulthood occurs. As the chrysalis case splits, the wrinkled-winged adult butterfly emerges. After stretching and drying, the butterfly takes to the air in search of a mate, and the cycle continues. The miracle is complete — the ugly caterpillar has become a beautiful, airborne ambassador of nature.

Common Missouri butterflies

Missouri's rich diversity of butterflies is based on its variety of natural habitats (forests, prairies, swamps, glades) and its central location in the United States. A total of 198 species of butterflies has been recorded in the state. Butterfly families are commonly named for unique body parts or dominant colors that distinguish them from the other butterfly groups. Distinctive types of behavior and specific caterpillar food sources also help set apart the different families. Brief descriptions of a few of the larger and showier common butterflies follow.

Swallowtail family

Swallowtails (family Papilionidae) are large, brightly colored butterflies that have a well-developed wing appendage ("tail") extending from the rear edge of each hindwing. This conspicuous appendage is not usually found in other butterfly families. Swallowtails presumably were given their common name because their "tails" reminded people of the long, pointed tails of barn swallows. One species, the pipevine swallowtail, feeds on pungent vines that make it distasteful to predators. Other similarly colored swallowtails may gain protection from predation by resembling or mimicking the appearance of the pipevine swallowtail.

Swallowtail caterpillars also display protective adaptations. The adults have large spots that appear as eyes of a larger animal, and the caterpillars have Y-shaped, orangish, retractable organs (osmeteria) behind their heads for protection. When disturbed, the caterpillar extends this organ, which emits a foul-smelling chemical and scares off predators because of its appearance.

Black swallowtail on butterfly milkweed

Brushfooted family

The last family that gets it name from distinctive body parts is the brushfooted butterflies (family Nymphalidae). All members of this large, diverse family have a relatively shortened front pair of legs compared with the other two pair. The stunted front pair of legs is useless for walking and is somewhat hairy or brushlike in appearance, hence the family name. The caterpillars typically are spined and darkly colored, and many feed only at night. The brushfooted adults commonly have orange coloration, are active fliers, and feed on a wide array of food sources, such as flowers, tree sap, animal wastes, and rotting fruit.

Question mark, a brushfooted butterfly, on buttonbush

White and Sulphur family
A widespread group of butterflies named for their color is the white and sulphur family (family Pieridae). These butterflies are principally white, orange, or yellow, with blackish markings and borders on their wings. The word "butterfly" was used to describe the yellow color of common European sulphurs. The larvae of the common white European cabbage butterfly, which was introduced into North America, feed on cabbage and related plants and are considered a pest species. Native sulphurs are common in fields and yards, where the larvae feed on clovers.

Dogface sulphur on purple coneflower

Blue and hairstreak family
Small butterflies that are commonly blue and gray are called blues and hairstreaks (family Lycaenidae). Some members of this butterfly group appear as small versions of swallowtails. However, these small butterflies have only thin, hairlike extensions projecting from the hindwings, not the wider, more developed wing extensions of swallowtails. At rest, blues and hairstreaks characteristically hold their wings folded over their backs. In this posture, patches of orange that decorate many species can be observed. Birds often strike color patches or tails, mistaking them for butterfly heads and allowing the butterflies to escape. Some caterpillars of this family produce a sugary substance called honeydew that is "milked" from the caterpillars by ants. In return for this honeydew, the ants protect the caterpillars from predators. The adult butterflies of this family are seen around flowers growing along roadsides, in fields, and in other open areas.

Olive hairstreak on butterfly milkweed

Skipper family
Another group of small butterflies is easily identified by a swift, bouncing, and erratic flight. This "skipping" flight pattern gives this group the name skippers (family Hesperidae). These little butterflies are generally brown, orange, or black. If you get close to a skipper, you will see that it has a stout body. Although all butterflies have clubbed antennae, skippers have distinctive hooks at the ends of their antennae.

Skipper on blazing star

Milkweed family
Milkweed butterflies (family Danaidae) get their name from feeding on milkweed plants. The caterpillars of this group apparently are immune to the toxic juice of the milkweed and consume it voraciously. Thus, both the caterpillars and adults are distasteful to predators, such as birds. The monarch is the most common and familiar milkweed butterfly and is easily recognizable by its bold orange and black color. (The viceroy, a brushfooted butterfly, resembles the monarch but is smaller and has a black line across the hindwing. Because of its similarity to the monarch, the viceroy also is avoided by predatory birds.) Male monarchs have an enlarged, dark spot in the middle of each hindwing that gives off a scent to attract females.

Although many insects migrate, the long-distance butterfly champion is the monarch. Each fall, Missouri monarchs join others that have come from as far away as Canada and migrate south to a small alpine fir forest, 75 miles west of Mexico City. This migration is truly one of the greatest natural phenomena in the world. Not only is it a miracle that this butterfly (weighing only about half a gram) migrates more than 2,000 miles, but no one knows how the 100 million monarchs find this overwintering ground when none of them has ever been there before. The migrating individuals are about five generations removed from the ones that made the trip last year.

Monarchs on goldenrod

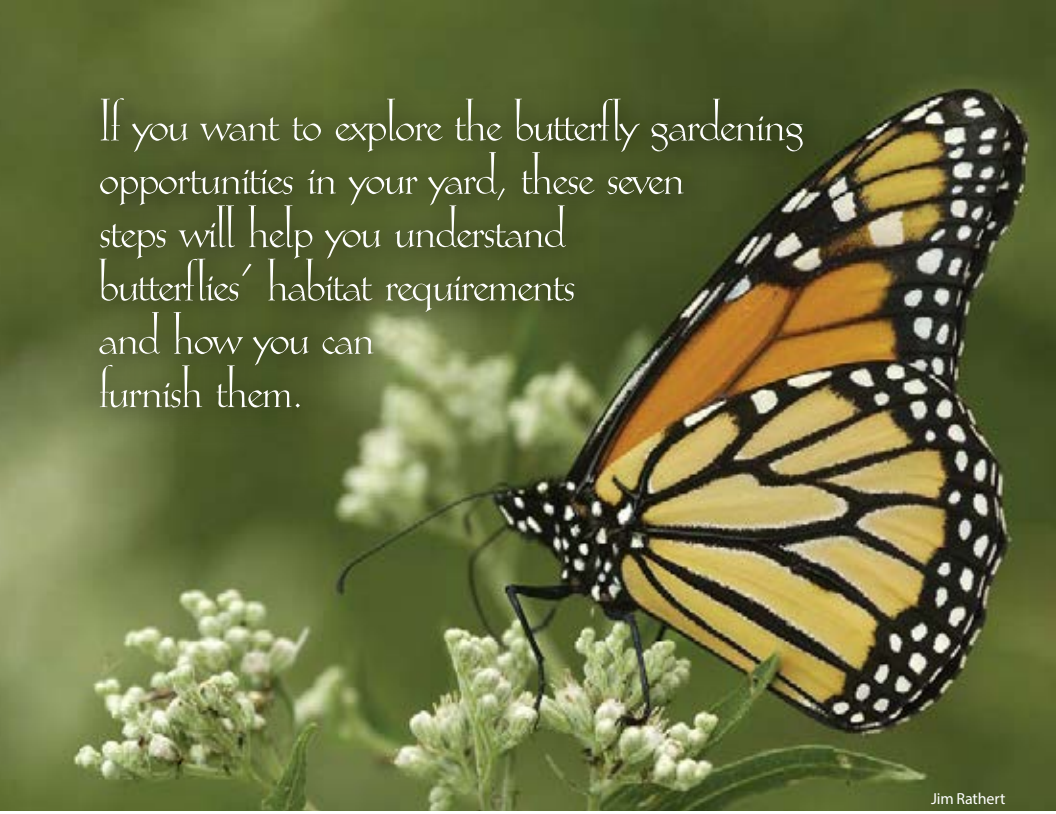
Butterfly milkweed and purple coneflower

Butterfly gardening and conservation

As our population grows, we exert more pressure upon the land — for food and living and working space. These increased demands alter or eliminate the natural vegetation that butterflies and other wildlife need to survive. In response, conservation efforts protect and enhance existing natural habitats, restore lost habitats, and create special habitats for wildlife.

You may want to apply conservation practices in your own yard by creating or restoring natural vegetation around your home. In fact, as more natural lands are altered to meet the needs of society, the importance of natural habitat around our homes increases, especially in cities and towns where so many of us live. If you like gardening and have an appreciation for smaller wildlife, planting butterfly gardens might interest you. Butterfly gardening can be a natural blend of formal gardening with a touch of home-style conservation — a blend that could open the gates to a whole new world in your own backyard.

If you want to explore the butterfly gardening opportunities in your yard, these seven steps will help you understand butterflies' habitat requirements and how you can furnish them.



Jim Rathert

Step 1. Conduct a butterfly survey

The first step in butterfly gardening is to find out what types of butterflies appear in your neighborhood during the warm times of the year. If there are no butterflies in your area, your butterfly gardening efforts may have limited success.

With the aid of a butterfly field guide to assist you with identification, visit open, sunny areas in your neighborhood and look for the large, showy, and slow-flying species. Identify the butterflies on the wing, or catch and immediately release them after identification.

Nearby flower gardens, meadows, woodland edges, vegetated ponds, unmowed and unsprayed roadsides, and neighborhood weed patches are worth investigating.

Besides determining which butterfly species are present, take notes on which types of plants they are visiting. Later, when you are deciding which plants to include in your butterfly garden, these notes will be useful.

Visit our online field guide at *mdc.mo.gov/field-guide*. Type in the name of a butterfly or moth. Each record includes at least one photo, a description, habitat and conservation notes, distribution in Missouri, and other details to help you identify, conserve, and enjoy these beautiful, beneficial insects.

Step 2. Design around the sun and wind

After you get an idea of what butterflies are found in your neighborhood, the next step is to choose a sunny site out of the wind for your butterfly garden. Because the vast majority of butterflies worship the sun, it is essential that these sites be located in the open, where they receive sunlight throughout much of the day. If you enjoy photographing butterflies, bright and calm conditions are ideal for close-up pictures.

Sun-loving butterfly milkweed attracts many species

All their activities are oriented around the sun. Butterflies not only use the sun to navigate but also use food plants that grow in full sun. They use the sun to increase their body temperature, which is necessary for strong flight. Butterflies are active on sunny days and inactive on cloudy days. On cool days and in the mornings, butterflies can be seen basking in the sunlight with their wings open and their bodies perpendicular to the sun to absorb heat quickly. If there are no light-colored stones or rocks near your garden area, you may want to place a few perpendicular to the morning sun to serve as basking sites.

Although many butterflies gather on windy hilltops to find mates, it is best to locate your butterfly garden out of the wind to ease their flight. Because butterflies use up more energy flying in areas plagued by wind gusts, presumably they prefer feeding in areas where they do not have to fight the wind.

Step 3. Plant adult nectar sources

The air is home for butterflies and flying requires great amounts of energy. Therefore, butterflies must locate high-energy food sources, such as nectar-producing flowers. Nectar contains energy-rich sugars and lipids and has about the same basic chemical make-up, no matter what flower it comes from. (The sugar concentration fluctuates, although generally it is about 40 percent.) Hence, a hungry adult butterfly may visit several different flowers for nectar. Likewise, a single, nectar-producing flower may be visited by several butterfly species. However, butterflies do have preferences.

Some flowering plants produce large amounts of nectar at certain times of the year and attract not only butterflies but also bumblebees and honeybees. Although there seems to be some overlap in the use of bee and butterfly nectar plants, butterflies visit (and may prefer) flowers that slowly and continually produce small amounts of nectar. Bees, on the other hand, prefer flowers that manufacture more nectar and pollen. Plants with flower heads that contain small, multiple florets, such as butterfly milkweed, apparently produce small amounts of nectar, are visited mainly by butterflies, and make the best butterfly garden nectar sources.

Flowers with multiple florets or with broad petals furnish butterflies with necessary landing pads where they can rest and sip nectar as well as pollinate the plants. However, some flowering plants have been hybridized by man to produce many landing pads at the expense of nectar production. So when selecting plant species, such as black-eyed Susans, for butterfly nectar sources avoid the really showy types and select the simple varieties.

When you plan your butterfly garden, strive to have something blooming from early spring to late fall. To fill gaps in your garden's blooming schedule, trim back flowers and bushes to delay blooming periods. You may want to contact a local native plant nursery, naturalist, or a member of a native plant organization to find out specific information about certain plant species.

The Suggested Books list on the back cover includes several titles about using native plants to benefit butterflies. Once you have chosen them, clump your nectar sources together to increase their attractiveness to butterflies and arrange them in stair-step fashion to take best advantage of the sun. Here is a recommended list of native flowering plants that are commonly used by various adult butterflies.

Butterfly nectar sources

Common name	Scientific name	Blooming period
Native wildflowers (generally 20–30" tall)		
Black-eyed Susan	*Rudbeckia hirta*	May-July
Butterfly milkweed *(orange milkweed)*	*Asclepias tuberosa*	May-July
Cardinal flower *(prefers moist site)*	*Lobelia cardinalis*	July-October
Indian paintbrush	*Castilleja coccinea*	April-July
Lanceleaf coreopsis	*Coreopsis lanceolata*	April-June
Ohio horsemint	*Blephilla ciliata*	May-August
Pale purple coneflower	*Echinacea pallida*	May-July
Purple milkweed	*Asclepias purpurascens*	May-July
Purple or white prairie clover	*Dalea spp.*	June-September
Rose verbena	*Glandularia canadensis*	March-November
Shining blue star *(prefers moist site)*	*Amsonia illustris*	April-May
Native wildflowers (generally 30–50" tall)		
Culver's root	*Veronicastrum virginicum*	June-July
Eastern blazing star	*Liatris scariosa*	August-September
Garden phlox	*Phlox paniculata*	July-August
Marsh milkweed *(prefers moist site)*	*Asclepias incarnata*	August-September
New England aster	*Aster novae-angliae*	September-October
Prairie blazing star	*Liatris pycnostachya*	July-August
Purple coneflower	*Echinacea purpurea*	June-August
Rattlesnake master	*Eryngium yuccifolium*	July-August
Yellow coneflower	*Echinacea paradoxa*	June
Native shrubs and small trees		
Buttonbush	*Cephalanthus occidentalis*	June-August
Eastern redbud	*Cercis canadensis*	March-May
Fragrant sumac	*Rhus aromatica*	March-April
Lead plant *(may die back to ground in winter)*	*Amorpha canescens*	June
New Jersey tea	*Ceanothus americanus*	May-June
Ninebark	*Physocarpus opulifolius*	May-June
Spicebush	*Lindera benzoin*	February-March
Wild hydrangea	*Hydrangea arborescens*	May-July
Wild plum	*Prunus americana*	March-May

Step 4. Furnish breeding & feeding grounds

If you are concerned with butterfly conservation and welcome the opportunity to observe the entire butterfly life cycle in your own yard, you should furnish breeding and larval feeding grounds for them. Although mating may occur anywhere, reproductively successful females will not venture great distances from specific host plants, especially if there is an ample supply of nectar nearby. Most adult butterflies lay their eggs on or near specific plants because these plants meet the nutritional needs of the larvae or caterpillars hatched from the eggs. This specificity is so strong that most caterpillars will starve to death if they cannot find their host plants in a field or yard soon after emerging from the egg.

The survival of some butterfly species is dependent upon their ingesting certain substances that make them unpalatable to would-be predators. The monarch butterfly feeds on milkweeds containing heart poisons and emetics in the milky latex, which are unpalatable to birds that might eat the monarch.

A list of the major host plants for some larger, showy, and common Missouri butterflies follows. Please realize that the caterpillar (larva) is the main feeding and growing stage in the butterfly life cycle. Therefore, these larval plants are sometimes partially or completely consumed. Also, some larval host plants may have some "weedy" characteristics — they may look unkempt, for example. Consequently, you may want to locate the breeding and feeding grounds in a less formal area of your property, somewhere away from your more formal butterfly nectar garden.

Butterflies emerge at different times of the year, and most species have two or more broods a year. Therefore, you may want to cut back some of the larval plants periodically, so tender, new growth is available for later generations of caterpillars.

Monarch butterfly caterpillars depend on native milkweed species

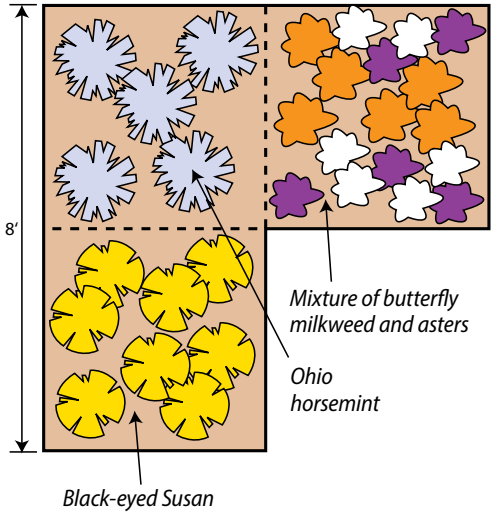
Jim Rathert

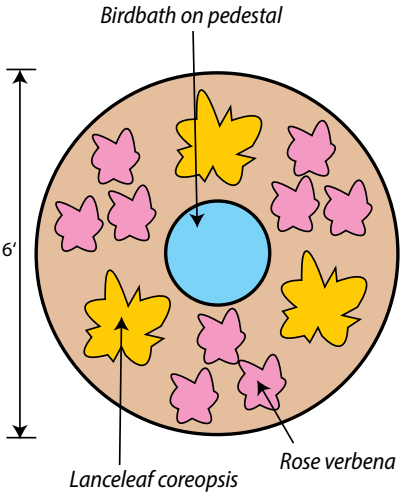
Recommended caterpillar foods

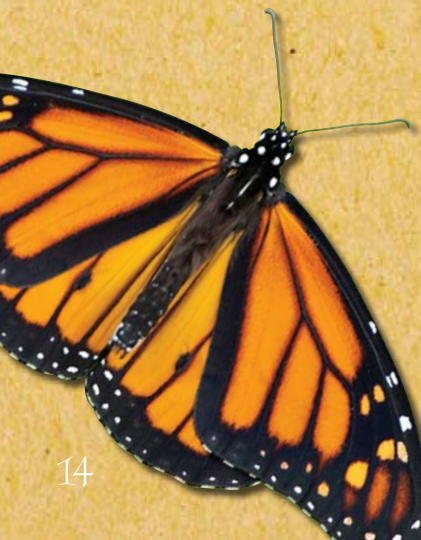
Butterfly species	Native host plant(s)
American painted lady *(Vanessa virginiensis)*	**Pussytoes** *(Antennaria parlinii)*
Black or parsnip swallowtail *(Papilio polyxenes asterius)*	**Golden Alexanders** *(Zizia aurea)* **Yellow pimpernel** *(Taenidia integerrima)* **Wild or garden parsnips** *(Thaspium spp.)*
Buckeye *(Precia lavinia)*	**Plantains** *(Plantago spp.)* **False foxgloves** *(Agalinis spp.)*
Cloudless sulphur *(Phoebis sennae)*	**Partridge pea** *(Cassia fasciculata)* **Sennas** *(Cassia spp.)*
Dogface sulphur *(Colias cesonia)*	**False indigo** *(Amorpha fruticosa)* **Lead plant** *(Amorpha canescens)* **Prairie clovers** *(Petalostemon spp.)*
Giant swallowtail *(Heraclides cresphontes)*	**Hoptree** *(Ptelea trifoliata)* **Prickly ash** *(Zanthoxylum americanum)*
Great spangled fritillary *(Speyeria cybele)*	**Blue violet** *(Viola sororia)* Other forest violet species
Hackberry butterfly *(Asterocampa celtis)*	**Hackberry tree** *(Celtis occidentalis)* **Sugarberry tree** *(Celtis laevigata)*
Monarch or milkweed butterfly *(Danaus plexippus)*	**Butterfly milkweed** *(Asclepias tuberosa)* **Common milkweed** *(Asclepias syriaca)* All other species of milkweed
Olive hairstreak *(Mitoura gryneus)*	**Eastern red cedar** *(Juniperus virginiana)*
Pipevine swallowtail *(Papilo philenor)*	**Pipevine** *(Aristolochia tomentosa)* **Virginia snakeroot** *(Aristo. serpentaria)*
Red-spotted purple *(Limenitis arthemis astyanax)*	**Willows** *(Salix spp.)* **Wild cherries** *(Prunus spp.)* **Wild crabapples** *(Malus spp.)*
Regal fritillary *(Speyeria idalia)*	**Bird's-foot violet** *(Viola pedata)* Other prairie violet species
Spicebush swallowtail *(Papilo troilus)*	**Spicebush** *(Lindera benzoin)* **Sassafras** *(Sassafras triloba)*
Tiger swallowtail *(Papilo glaucus)*	**Hop tree** *(Ptelea trifoliata)* **Prickly ash** *(Zanthoxylum americanum)*
Viceroy *(Limenitis archippus)*	**Willows** *(Salix spp.)* **Wild cherries** *(Prunus spp.)*
Zebra swallowtail *(Eurytides marcellus)*	**Pawpaw** *(Asimina triloba)*

Step 5. Sketch your plans

After studying the preceding lists and consulting local native plant nurseries and naturalists about plant characteristics, decide which plants appeal to you and are suitable for your yard. Then sit down and sketch a plan or two. Remember to consider the sun and wind. Following are some examples that may be helpful.



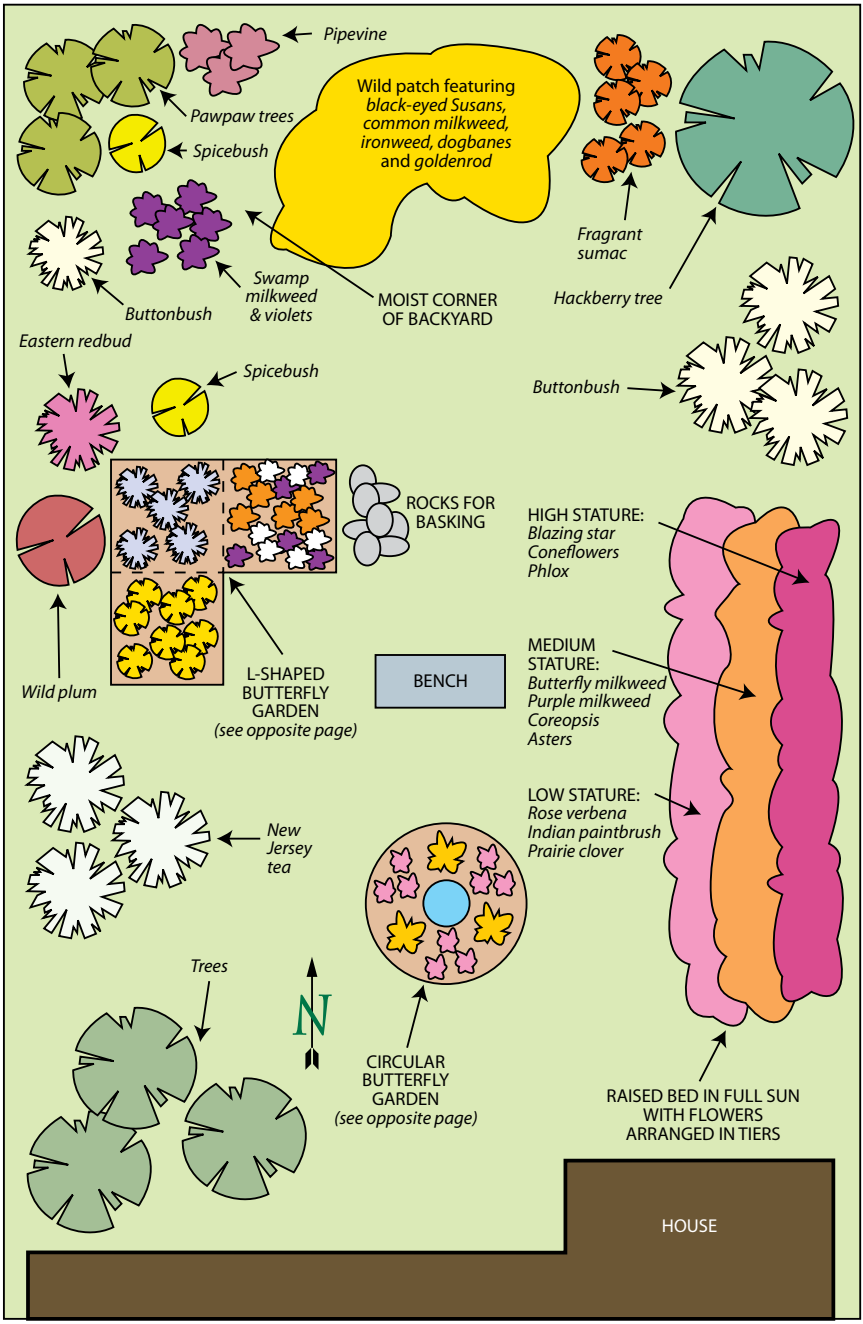




GROW native!

Missouri Prairie Foundation

Find more native plant butterfly gardening info and landscape designs at
grownative.org


Pipevine
Pawpaw trees
Spicebush
Wild patch featuring
black-eyed Susans,
common milkweed,
ironweed, dogbanes
and goldenrod
Fragrant
sumac
Swamp
milkweed
& violets
Buttonbush
MOIST CORNER
OF BACKYARD
Hackberry tree
Eastern redbud
Spicebush
Buttonbush
ROCKS FOR
BASKING
HIGH STATURE:
Blazing star
Coneflowers
Phlox
Wild plum
L-SHAPED
BUTTERFLY
GARDEN
(see opposite page)
BENCH
MEDIUM
STATURE:
Butterfly milkweed
Purple milkweed
Coreopsis
Asters
LOW STATURE:
Rose verbena
Indian paintbrush
Prairie clover
New
Jersey
tea
Trees
N
CIRCULAR
BUTTERFLY
GARDEN
(see opposite page)
RAISED BED IN FULL SUN
WITH FLOWERS
ARRANGED IN TIERS
HOUSE

Step 6. Use diversity, not pesticides

Pesticides kill butterflies. Although there is variability in application strength, toxicity, weather conditions, and so on, pesticides can kill every insect that comes in contact with them. Most pesticides do not control only one insect or animal group. Some pesticides not only kill harmful and beneficial insects alike but also affect the health of songbirds, pets, and even humans. Butterfly gardening is next to impossible when pesticides are sprayed in the area.

If you have rich plant diversity in your butterfly areas, you probably won't need to use pesticides because most pest situations occur when there is an abundance of one or two plant species. The populations of one or two insect species will explode to take advantage of food produced by these one or two plant species. The reproductive rate of natural predators such as birds cannot match that of these insect pests, and a problem arises.

However, in a yard with a high plant diversity, this food glut does not occur and natural predation keeps potential pest populations in check. If an imbalance does occur, there are organic gardening remedies that can be used. Selective removal of pest-ridden species should be considered.

Step 7. Accommodate nature

Many butterflies use the opportunistic, resilient plants that we commonly call weeds. Several tall and weedy wildflowers, such as milkweeds, dogbanes, nettles, and ironweeds, may invade areas of your yard if you let them. (Refer to lists of Butterfly Nectar and Larval Sources for more examples.) Tolerate weedy natives that butterflies use for food. Many butterflies will seek shelter among the tall flowers and grasses at night or during bad weather.

Although these weedy species may not be appropriate for formal gardening situations, accommodate their growth in portions of your backyard. Allow patches or strips of lawn to grow wild.

If your backyard is large, a small meadow can be created by adopting a non-mowing policy in the meadow area. To avoid possible complaints from your neighbors or local health department, mow a strip around your meadow, especially close to property boundaries. Also, tell your neighbors about your butterfly habitat so they know you are not being negligent. To maintain your wild patch or flowering meadow, cut it at the end of the summer, every year or two. This natural type of landscaping not only helps butterflies but saves you time and money.


Jim Rathert

Butterfly conservation in your community

If you want to broaden the scope of butterfly conservation from your backyard to your community, opportunities await. Whenever possible, share the information that you have learned about butterflies and the benefits of a natural, toxin-free environment. Opportunities to speak to groups, write articles, and teach workshops are typically yours for the asking. Few things in the world are more pleasurable than helping others (especially children) nurture their interest in nature. Butterflies furnish the perfect vehicle to learn about and experience the natural world around us.

Encourage grounds supervisors and other managers of public and private lands to support butterfly conservation. Ask them to sow butterfly food plants and manage the land so these plants thrive. Common grounds, schoolyards, institutional grounds, commercial properties, roadsides, and railroad rights-of-way can be managed to help wildlife such as butterflies. Enlist the support of public officials to limit or eliminate pesticide spraying and to develop a more natural land management approach by limiting the mowing of portions of parks and other public parcels to once a year in the late summer.

To learn more about butterflies, as well as to enlist the help of other concerned citizens in butterfly conservation, join garden clubs and natural history organizations, especially the entomological (insect) and native plant groups. (Some of these organizations and their addresses are listed on the back cover.) Much information can be obtained from active participation in these groups. Members can show you how to rear butterflies or propagate butterfly food plants.

Encourage your group to assist in tagging monarchs during fall migration or in butterfly surveys. Local natural history organizations can assist in the annual national Fourth of July Butterfly Count conducted by the Xerces Society. Counts such as this will give us an indication of the healthiness of our local community, and when national statistics are accumulated over the years, serve as a national or even global barometer.

Butterfly Conservation Organizations

Butterfly House of the Missouri Botanical Garden
butterflyhouse.org
Fosters a greater understanding of plant and animal relationships in the environment in order to promote the conservation and restoration of natural habitats

Grow Native!
grownative.org
Missouri Prairie Foundation's native-plant education and marketing program for gardeners and landscape professionals

Missouri Native Plant Society
monativeplants.org
Promotes the enjoyment, preservation, conservation, restoration, and study of the flora native to Missouri

Monarch Watch
monarchwatch.org
Promotes the conservation and restoration of native milkweeds to provide habitat for migrating monarch butterflies

North American Butterfly Association
naba.org
Works to increase public enjoyment and conservation of butterflies

Wild Ones
wildones.org
Promotes the use of native plants as habitat for native pollinators and other wildlife, storm-water absorption, and carbon storage

Xerces Society
xerces.org
Protects wildlife through the conservation of invertebrates and their habitat

Suggested Books

Attracting Butterflies and Hummingbirds to Your Backyard: Watch Your Garden Come Alive with Beauty on the Wing. Sally Roth. 2002. Rodale Press, Emmaus, PA. 304 pages.

Butterfly Gardening: Creating Summer Magic in Your Garden (Second Edition). Xerces Society and Smithsonian Institution. 1998. Sierra Club Books, San Francisco, CA. 192 pages.

Garden Butterflies of North America: A Gallery of Garden Butterflies and How to Attract Them. Rick Mikula. 2001. Willow Creek Press, Minocqua, WS. 143 pages.

Go Native! Gardening with Native Plants and Wildflowers in the Lower Midwest. Carolyn Harstad. 1999. Indiana University Press, Bloomington, IN. 278 pages.

Missouri Wildflowers (Sixth Edition). Edgar Denison. 2008. Missouri Department of Conservation, Jefferson City, MO. 276 pages.

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